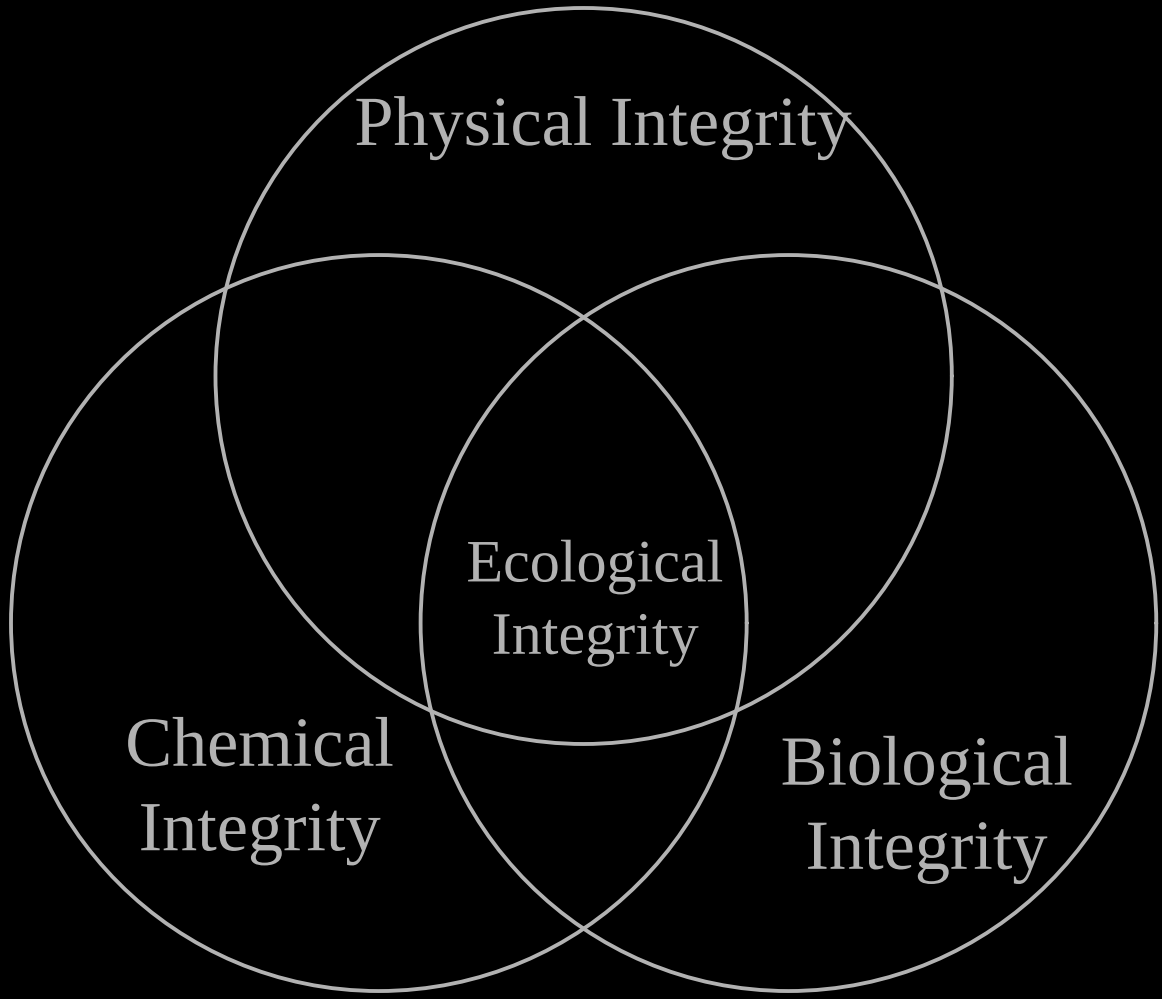
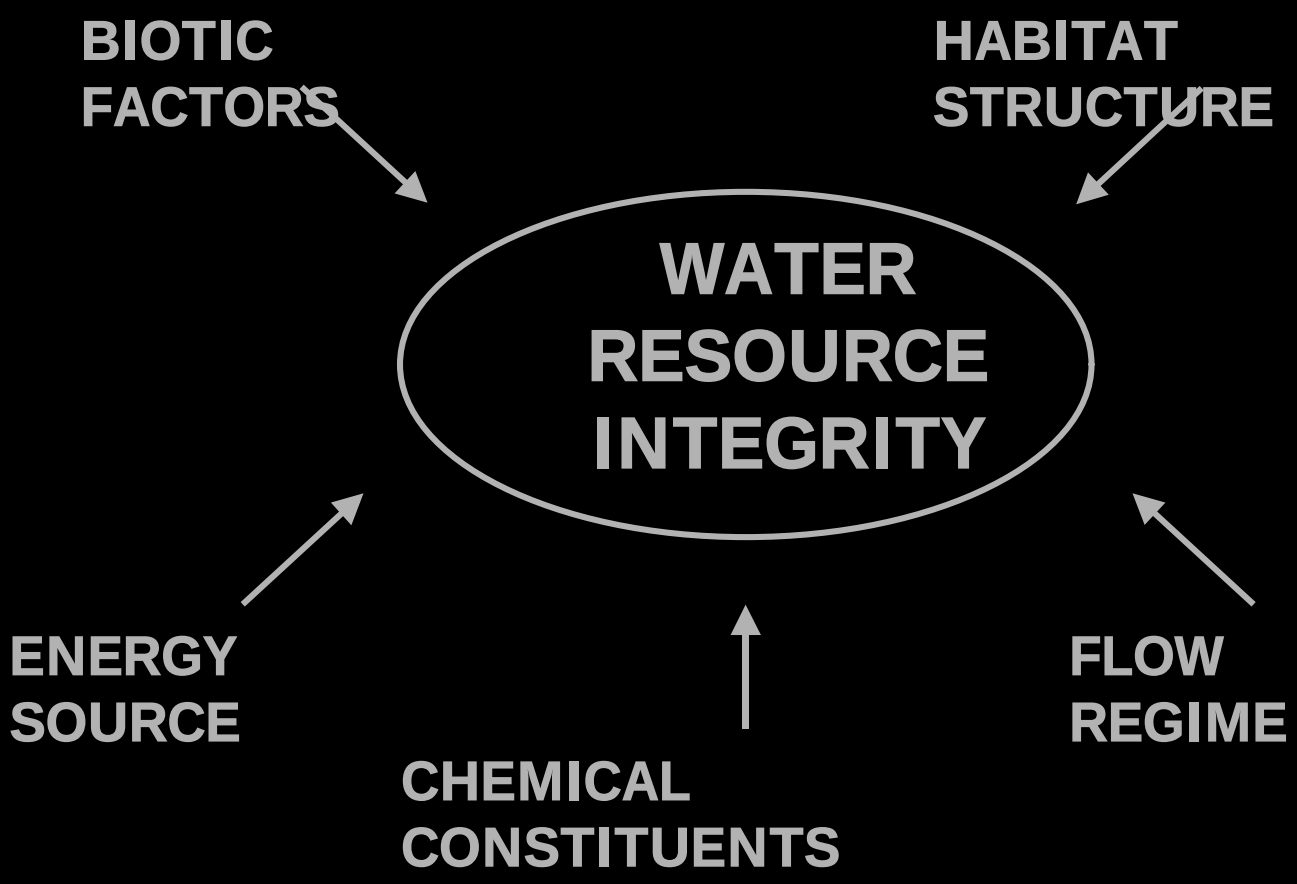
Bioassessment and Biocriteria:

An Overview of the Status in State Water Resource Agencies


Physical Integrity
Ecological Integrity
Chemical Integrity
Biological Integrity


BIOTIC FACTORS
HABITAT STRUCTURE
WATER RESOURCE INTEGRITY
ENERGY SOURCE
CHEMICAL CONSTITUENTS
FLOW REGIME

Biological integrity

- **Has been defined as the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats of a region (Karr and Dudley 1981).**

By definition (of biological integrity)

U.S. biological programs are based on measurements of attributes that represent the various components of biological integrity.

By definition (of biological integrity)

maintenance of the aquatic community

balanced elements and integrative processes

- **composition**
- **diversity and richness**
- **functional organization**

Water Quality Goals
Standards Framework

- **Water Quality Standards**
  - **"A water quality standard defines the water quality goals of a waterbody, or portion thereof, in part by designating the use or uses to be made of the water"**
  - **"Water quality standards should 'provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife...(fishable)"**
  - **"It is EPA's policy that States should designate aquatic life uses that appropriately address the biological integrity and adopt biological criteria necessary to protect those uses"**

Focus on Bioassessment

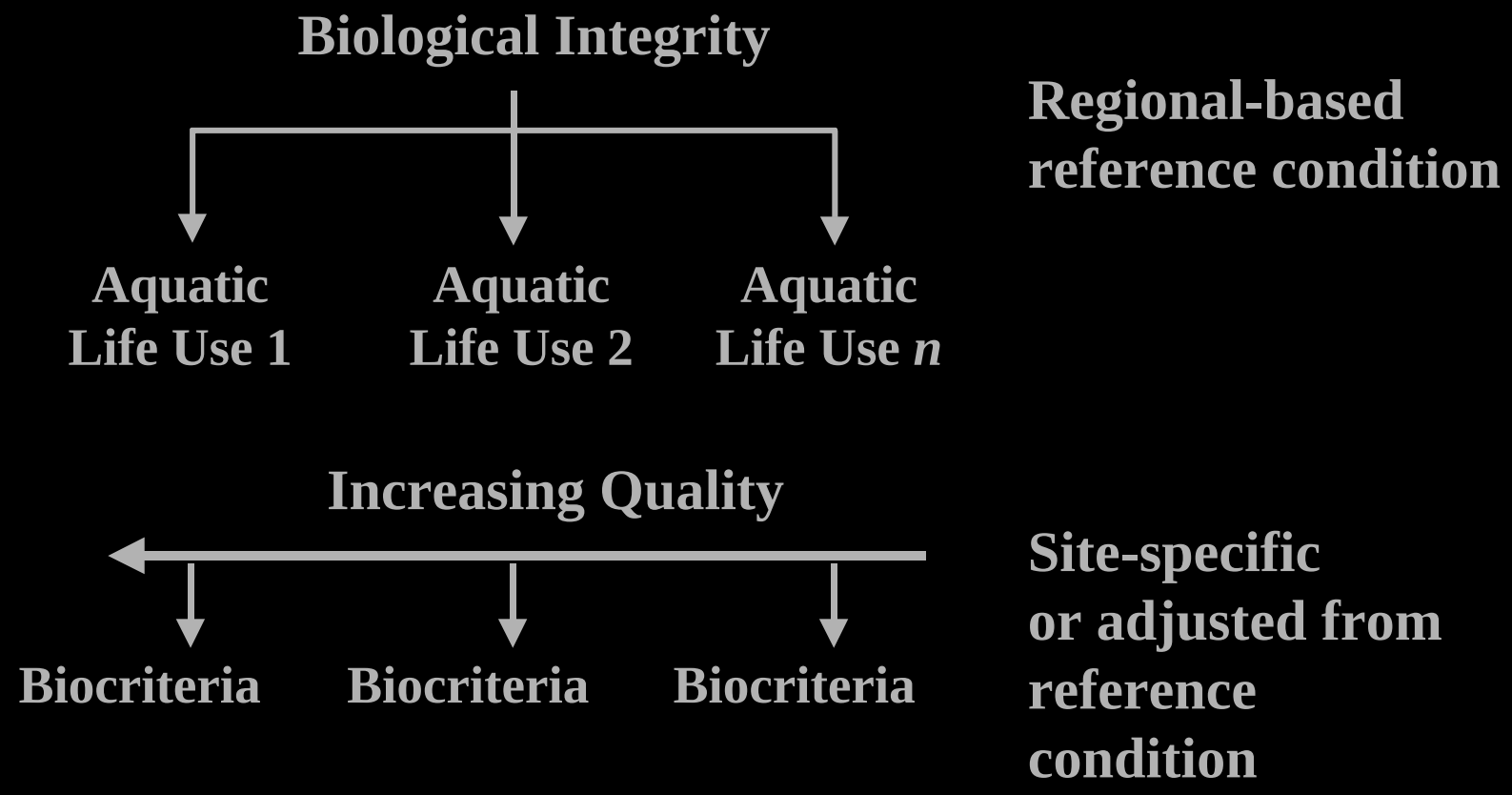
- **The National Water Quality Monitoring Council (formerly the Intergovernmental Task Force on Monitoring Water Quality) is working to have Federal and State agencies adopt consistent approaches for:**
  - **defining representative reference conditions throughout a region;**
  - **performing biological surveys of targeted assemblages in each waterbody type;**
  - **implementing stringent quality assurance on data acquisition and analysis; and**
  - **storing and analyzing biological (and physicochemical) data for assessment and monitoring.**

Biological Criteria (Biocriteria)

- **Numerical values or narrative expressions that describe the reference biological condition of aquatic communities inhabiting waters of a given designated aquatic life use.**

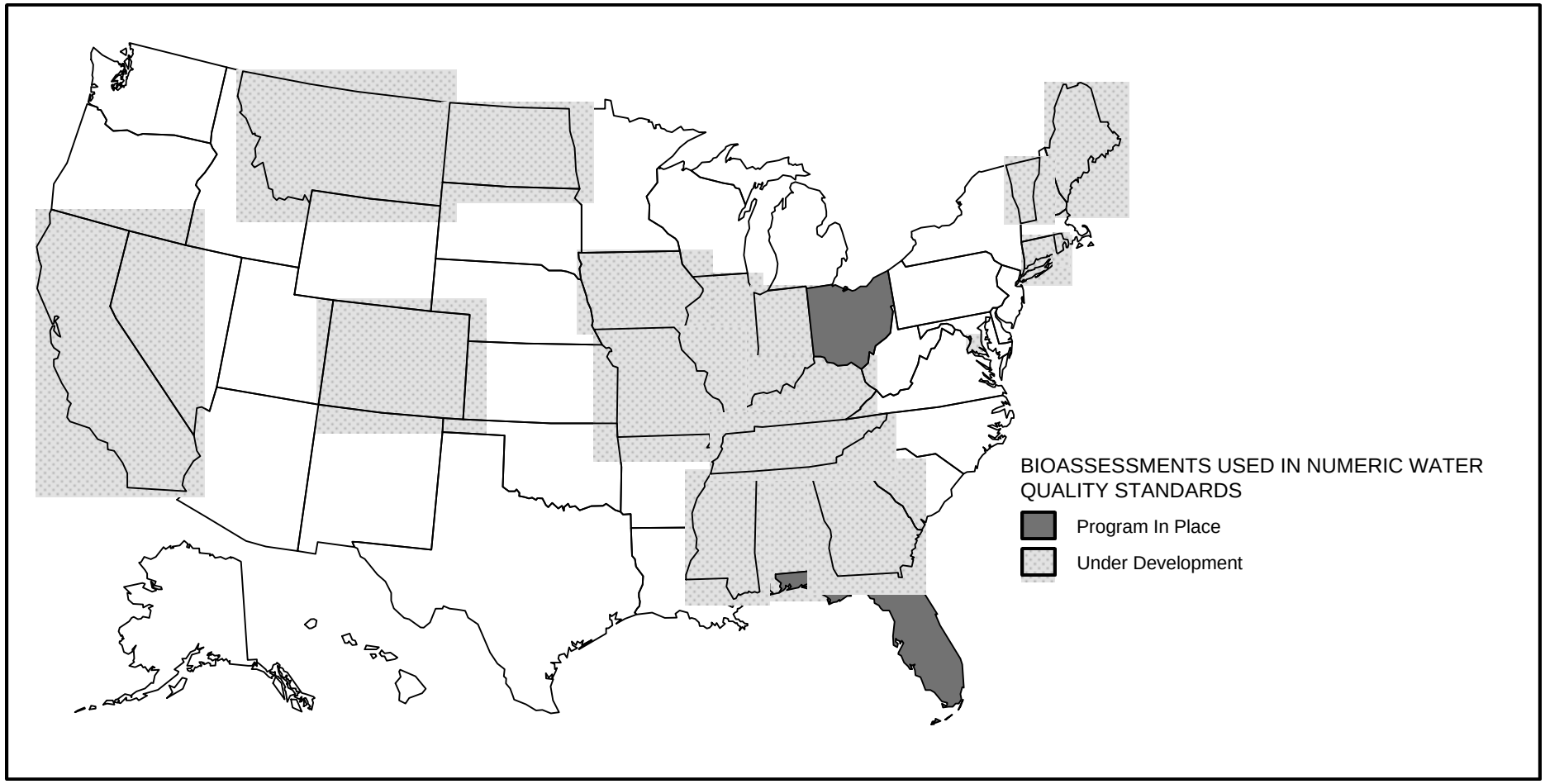
Aquatic Life Designated Use and Biological Integrity

- **Preferably aquatic life use would be measured by biological integrity indicators (biocriteria)**


Biological Integrity
Aquatic Life Use 1
Aquatic Life Use 2
Aquatic Life Use *n*
Regional-based reference condition
Increasing Quality
Biocriteria
Biocriteria
Biocriteria
Site-specific or adjusted from reference condition

Goal	=	Biological Integrity
Standards	=	Aquatic Life Use
Operational Measurement	=	Biological Criteria
Tool of Measurement	=	Biological Survey

USE OF BIOASSESSMENTS IN STATE PROGRAMS



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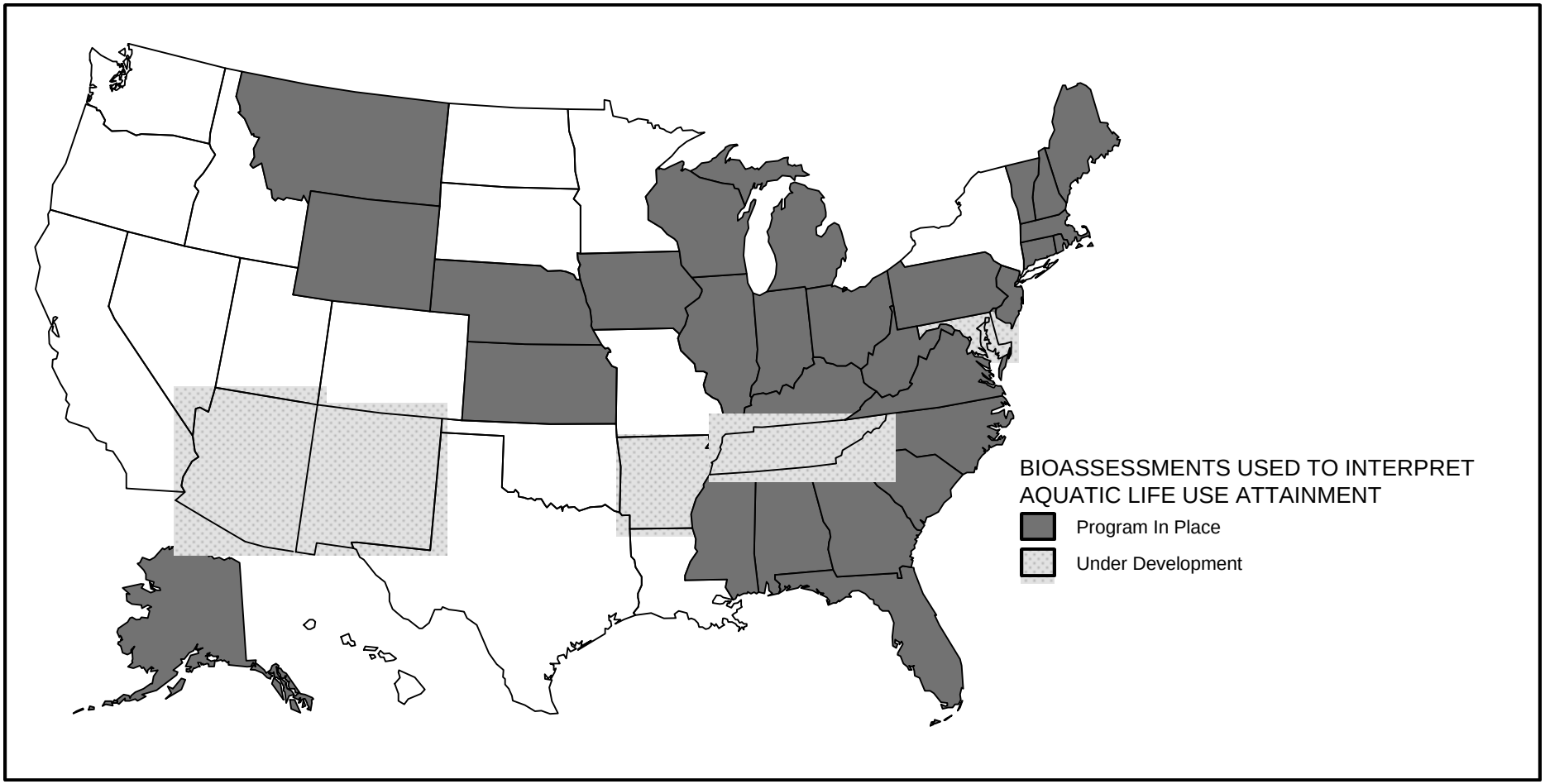

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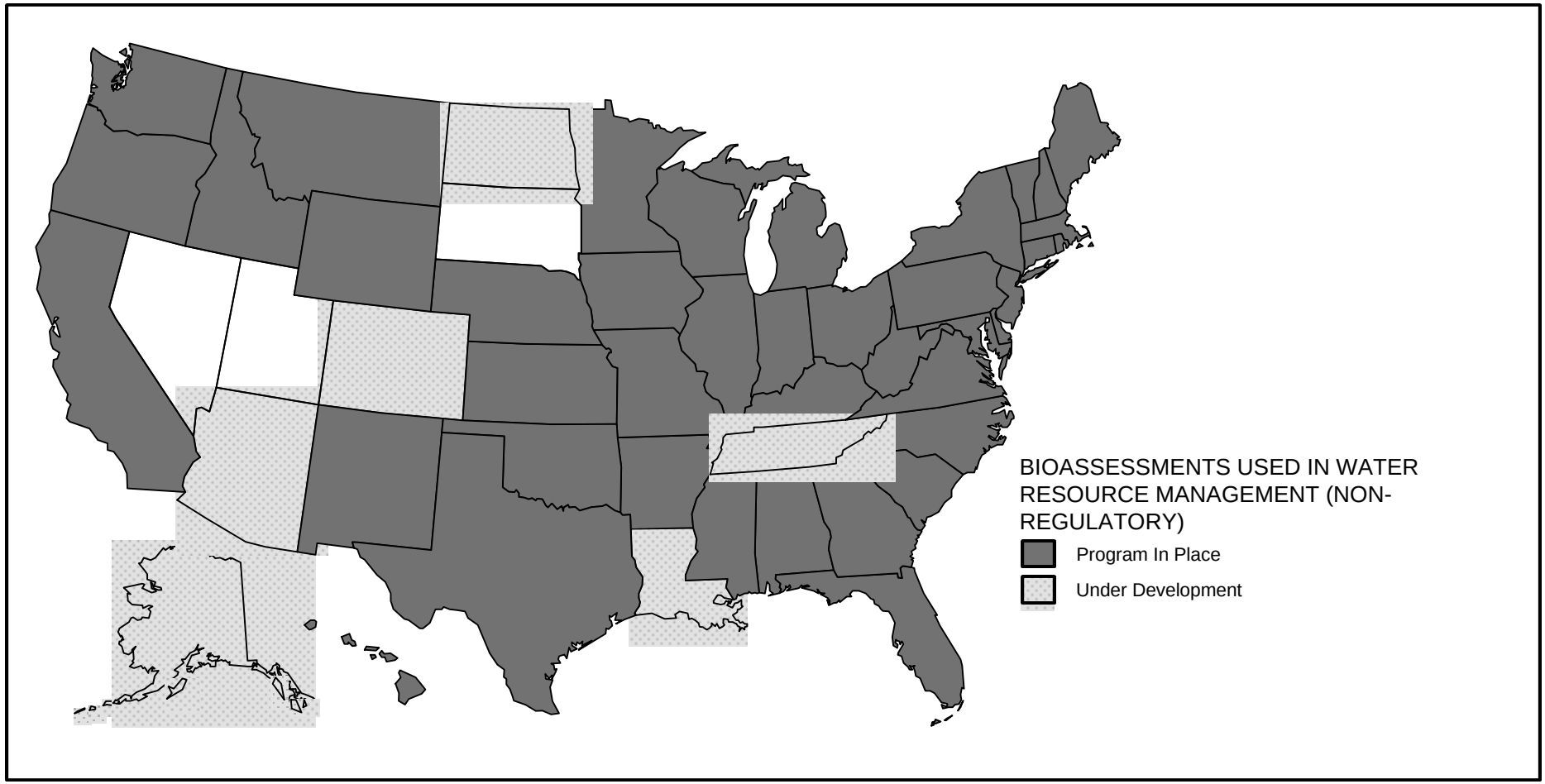
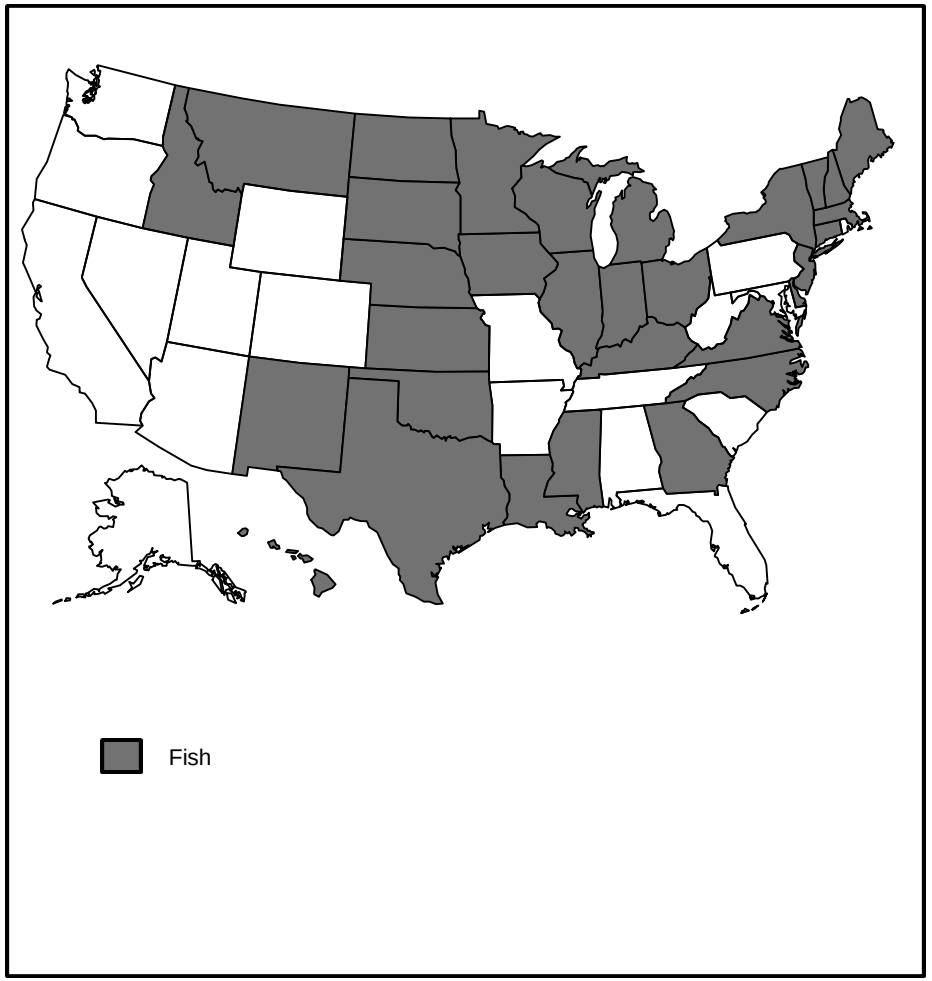
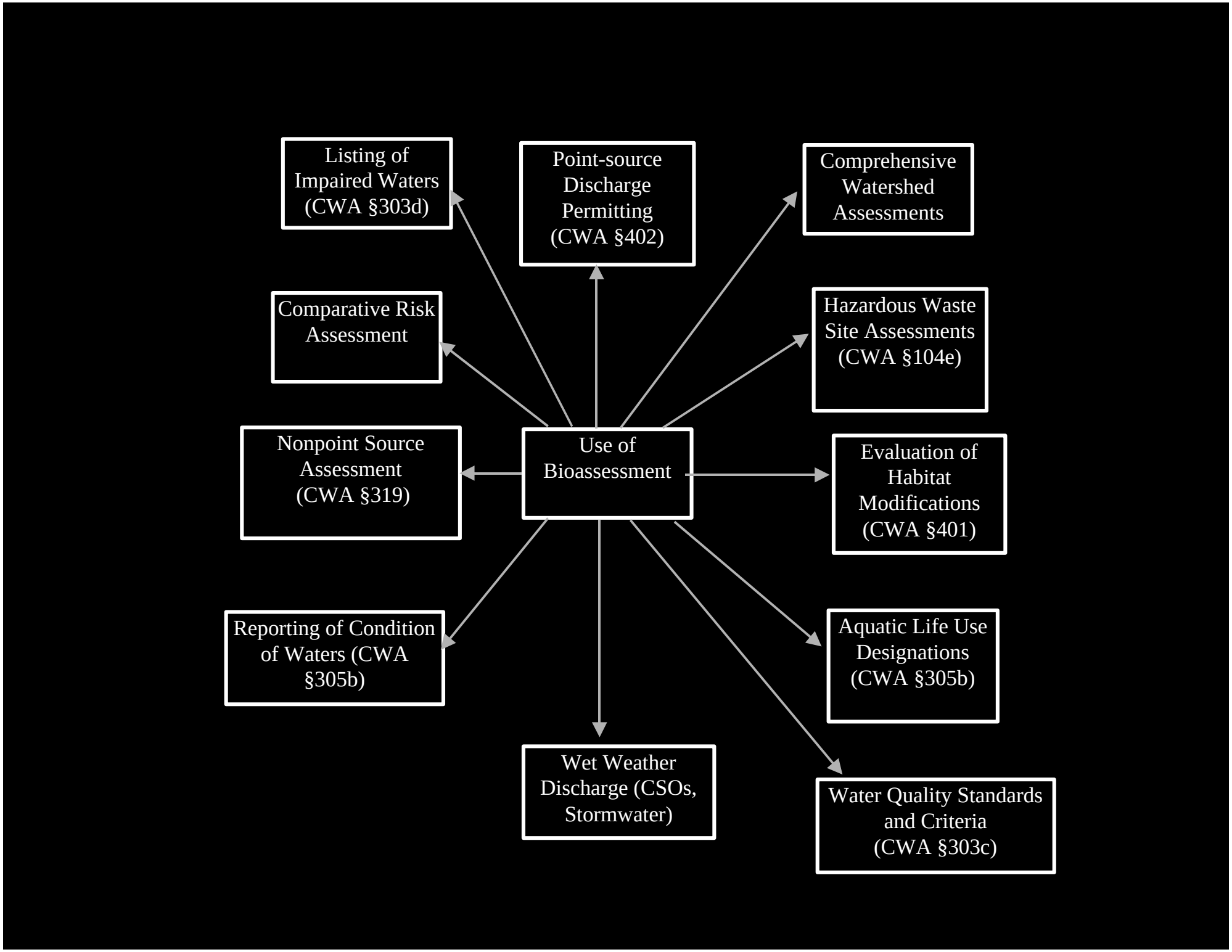


TARGET ASSEMBLAGES USED IN STATE BIOASSESSMENT PROGRAMS




Listing of Impaired Waters (CWA §303d)
Point-source Discharge Permitting (CWA §402)
Comprehensive Watershed Assessments
Comparative Risk Assessment
Hazardous Waste Site Assessments (CWA §104e)
Nonpoint Source Assessment (CWA §319)
Use of Bioassessment
Evaluation of Habitat Modifications (CWA §401)
Reporting of Condition of Waters (CWA §305b)
Aquatic Life Use Designations (CWA §305b)
Wet Weather Discharge (CSOs, Stormwater)
Water Quality Standards and Criteria (CWA §303c)

Strengths of Biological Surveys

- Properly developed methods, metrics, and reference conditions provide a tool that enables a direct measure of the ecological condition of a waterbody.
- Once a framework is in place for bioassessment, biological monitoring can be relatively inexpensive, and easily performed with standard protocols and consistent training.

Strengths of Biological Surveys

- Bioassessment provides indications of cumulative impacts of multiple stressors, not just water quality.
- Biological community condition reflects both short- and long-term effects, and directly evaluate the condition of the water resource.
- Biological data can be interpreted based on regional reference condition, where single reference sites are lacking or inadequate.